

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

June 2001

BUDGET ACTIVITY
6 - MANAGEMENT SUPPORT

PE NUMBER AND TITLE
0605604A - Survivability/Lethality Analysis

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	37153	36905	27794	0	0	0	0	0	0	0
670 EMERGING TECH SYSTEMS	5301	6272	4540	0	0	0	0	0	0	0
671 AIR DEF/MSL DEF SYSTEM	5224	5888	5369	0	0	0	0	0	0	0
672 AVIATION SYSTEMS	2528	2789	3002	0	0	0	0	0	0	0
675 ARMY SURVIVABILITY ANALYSIS & EVALUATION SUPPORT	14331	12240	4553	0	0	0	0	0	0	0
677 GROUND COMBAT SYSTEMS	5154	4449	4737	0	0	0	0	0	0	0
678 MUNITIONS SYSTEMS	4208	4810	5107	0	0	0	0	0	0	0
679 SOLDIER SYSTEMS	407	457	486	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification:

PLEASE NOTE: This administration has not addressed FY2003-2007 requirements. All FY 2003-2007 budget estimates included in this book are notional only and subject to change.

This Program Element (PE) funds activities and functions to conduct objective and integrated survivability and lethality analyses (SLA) on systems of the Interim and Objective Forces of Army Transformation and other major and designated non-major Army systems as appropriate. The analyses quantify the effects of electronic warfare (EW) and ballistic battlefield threats and meteorological conditions on Army individual soldiers and systems. This PE also funds vulnerability assessments of digitized systems for Force XXI. The work is accomplished through threat research, theoretical and engineering analyses, signature measurements, modeling, simulations, laboratory experiments, and field investigations. Activities in progress include assessment of the effects of atmospheric, passive countermeasures, tactics, lasers, high-power microwave, electro-optical/radio frequency (EO/RF) jammers, electromagnetic environment effects (E3), information warfare (IW), decoys, and conventional ballistics on Army soldiers and systems. The PE work efforts provide U.S. Army decision makers, materiel and combat developers, system users, and independent evaluators critical soldier and system survivability analyses that quantify the soldier/system's survivability effectiveness in battlefield threat environments. Recommendations are provided to the materiel and combat developers on how to mitigate soldier/system deficiencies and enhance their survivability. This survivability/lethality engineering analyses is required to support the Army's vision to move to lighter more deployable systems while maintaining effectiveness. The analysis is required to properly down-select the appropriate mix of technologies for future platforms of the Transformed Forces. The proper mix of lethality and survivability provides the required force effectiveness for the Transformation Force. This PE funds civilian salaries, travel, development and maintenance of equipment and facilities, general management, administrative and contractor support required for program execution. The U.S. Army Research Laboratory (ARL) Survivability/Lethality Analysis Directorate (SLAD) conducts this effort.

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<u>B. Program Change Summary</u>	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	34892	27248	27406	0
Appropriated Value	35138	37248	0	
Adjustments to Appropriated Value	0	0	0	
a. Congressional General Reductions	0	0	0	
b. SBIR / STTR	-659	0	0	
c. Omnibus or Other Above Threshold Reductions	-103	0	0	
d. Below Threshold Reprogramming	2920	0	0	
e. Rescissions	-143	-343	0	
Adjustments to Budget Years Since FY2001 PB	0	0	388	
Current Budget Submit (FY 2002/2003 PB)	37153	36905	27794	0

Change Summary Explanation: Funding - FY 2001 Funds (+10000) - Congressional funding increase provides information operations vulnerability assessments and methodology testbed.

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PROJECT
670

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
670 EMERGING TECH SYSTEMS	5301	6272	4540	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project performs integrated survivability/lethality analyses for the category of systems which include Horizontal Technology Integration systems, Advanced Technology Demonstration initiatives, and proposed survivability enhancements to weapon platforms. Survivability deficiencies are identified, and recommendations are made to Program Executive Officers and Program Managers (PEOs/PMs) to provide hardening fixes early in program development. Work is accomplished through threat research, theoretical and engineering analyses, laboratory experiments, models, simulations, and field investigations. This effort also supports HQDA, independent evaluators, and PEOs/PMs with technical expertise in electronic warfare (EW), ballistics, and meteorology to conduct special studies and to support Test Integration Working Groups (TIWGs), weapon system program reviews, acquisition documentation reviews, and Government testers. This project also provides oversight of the Army's Electromagnetic Environmental Effects (E3) Program. Horizontal Technology Integration systems include Second Generation FLIR (2nd GEN FLIR), Battlefield Combat Identification System (BCIS), Global Positioning System (GPS), and Enhanced Position Location Reporting System (EPLRS). Advanced Technology Demonstration initiatives include Precision Guided Mortar Munition, Tactical Command and Control Protect (TCCP), and Direct Fire Lethality. Proposed survivability enhancements to weapon platforms include advanced armament technologies, defensive aide suites (DAS), missile countermeasure devices (MCD), emerging propellant technologies, advanced propulsion systems, advanced electronics, and improved spall liners in combat vehicles. To ensure survivability of the Army's Transformation force survivability analyses will be required that can address the new technologies for the Interim and Objective Forces and allow the optimum contribution of technologies that reduce signature, countermeasure threats, combinations of active and passive protection systems and protect the situation awareness and communications for a functionally dispersed set of systems to survive cooperatively. The system of systems (distributed functionality) for the Interim Force and Future Combat Systems and the notion of cooperative survivability adds complexity to these engineering level analyses required for the trade-offs.

FY 2000 Accomplishments

- 1431 Continued EW vulnerability investigations and analyses in support of integrated survivability and lethality analyses of advanced 2nd and 3rd generation emerging technology and horizontal technology applications. Prepared survivability analysis reports.
- 1400 Performed ballistic effects investigations and survivability/lethality analyses of candidate emerging technologies most influential on future system designs, including advanced armors (active protection systems), advanced armaments (electric armaments and electro-thermal chemical), advanced propellants, and advanced vehicle propulsion. Investigated Advanced Kinetic Energy Cartridge and Precision Guided Mortar Munition.
- 850 Continued vulnerability analysis of Army's digitized battlefield systems to radio frequency (RF) weapons. Identified possible countermeasure to threat RF weapons. Supported Army E3 program.

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FY 2000 Accomplishments (Continued)

- 1620 Prepared a technical report that assessed the potential utility to Army users of the Joint Modeling and Simulation System (JMASS) objective systems as described in the JMASS "to be" technical reference architecture and prepared an assessment of the Army's stake in JMASS. Supported the Initial Operational Capability (IOC) Scenario Development effort. Developed a technical plan for the Army's IOC effort that demonstrates the functionality of JMASS to support Army needs.

Total 5301

FY 2001 Planned Program

- 1632 Perform ballistic effects investigations and survivability/lethality analyses of emerging technologies and support ballistic vulnerability and lethality studies of Armor and Munition ATDs.
- 869 Support analysis of Army's ability to protect modern commercial based tactical information networks, components and data though TCCP. Analyze digitized battlefield systems to radio frequency (RF) weapons. Support Army E3 program.
- 1636 Perform integrated EW survivability and lethality investigations and analyses of emerging technology systems, including performance predictions of new hit avoidance concepts.
- 314 Formulate initial design of an Information Operations Vulnerability Survivability Assessment (IOVSA) test bed. Demonstrate how an IOVSA test bed provides the Army with the capability to conduct rigorous and comprehensive IO vulnerability assessments.
- 1700 Construct an engineering model that can be used with Combined Arms and Support Task Force Evaluation Model (CASTFOREM) to demonstrate the Decision Related Structure (DRS) concept. The structure of how information is passed and used on the battlefield can be referred to as DRS and is inherent in every information infrastructure. The DRS represents an open, complex system whose dynamics must be understood to assess vulnerabilities of the IO threat.
- 121 Small Business Innovative Research/Small Business Technology Transfer Programs

Total 6272

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PROJECT
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FY 2002 Planned Program

- 900 Expand E3 predictive capabilities for new materials and out year threats. Continuously identify possible countermeasure to threat RF weapons. Support Army E3 program.
 - 1874 Perform ballistic effects investigations and survivability/lethality analyses of emerging technologies and support ballistic vulnerability and lethality studies of Armor and Munition ATDs.
 - 766 Perform integrated EW survivability and lethality investigations and analyses of emerging technology systems, including performance predictions of new hit avoidance concepts.
 - 1000 Continue to support the Future Combat System (FCS) through IPT structure with focus on evaluation of the survivability of concepts. Provide analyses supporting technology development (APS, Advanced Armaments, Advanced Vehicle Propulsion Systems, Advanced Armor).
- Total 4540

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0605604A - Survivability/Lethality Analysis

PROJECT
671

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
671 AIR DEF/MSL DEF SYSTEM	5224	5888	5369	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project provides the survivability/lethality analysis of U.S. Army air defense and missile defense systems to battlefield threats and recommends fixes to improve their battlefield survivability. The results are used: by each Project Manager (PM) and the Program Executive Officer (PEO) to direct weapon system development efforts and structure product improvement programs; by the independent evaluator when they provide system evaluations in support of milestone decisions; by the user to develop survivability/lethality requirements, doctrine and tactics; and by decision makers in formulating program/production decisions. Anti-Radiation Missile (ARM) Counter-Arm efforts assess threat technologies against Theater High Altitude Air Defense (THAAD) and National Missile Defense (NMD), PATRIOT, Medium Extended Air Defense System (MEADS), and Forward Area Air Defense - C21 (FAAD -C21) ground based sensors. Also funds salaries, travel, equipment/facilities, and management/administrative support needed to execute the program.

FY 2000 Accomplishments

- 2400 Conducted integrated survivability, lethality, vulnerability analyses for developmental U.S. Army air defense and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. Provided interim survivability reports. Recommended survivability enhancements. Supported NMD electronic countermeasures (ECM) analysis. Supported THAAD Radar ECM Field Investigations.
- 500 Conducted ballistic survivability/lethality analysis for U.S. Army air defense and missile defense systems.
- 1500 Supported Sentinel P3I program. Developed NMD integrated survivability/lethality assessment for deployment review.
- 500 Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Characterized and assessed advanced focal plane array missile seekers and developed ECM to defeat them through simulation, modeling and lab testing.
- 324 Electronic Countermeasures (ECM) Simulation - Common Set (Partner: Australia): Developed a common set of ECM simulations for investigating the EW effects on specific threat missile systems. Developed methodologies to evaluate ECM against infrared, electro-optical guided missiles to determine degradation.

Total 5224

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PROJECT
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FY 2001 Planned Program

- 2716 Provide strawman ECM parameters in support of PATRIOT post-MS III missile countermeasures experiments. Provide electronic counter- counter measure (ECCM) performance analysis of PACM risk reduction program. Conduct integrated survivability lethality vulnerability analyses for other developmental U.S. Army air defense and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. Provide interim survivability reports. Recommend survivability enhancements.
 - 877 Analyze ECM experiments in support of PATRIOT post-MS III missile countermeasures experiments. Conduct THAAD Battle Management C4I EW Countermeasure Investigations during EMD.
 - 1420 Conduct ballistic survivability/lethality analysis for U.S. Army air defense and missile defense systems.
 - 225 Complete NMD integrated survivability/lethality assessment for deployment final review. Provide survivability support to PATRIOT post-MS III growth program. Complete survivability analysis for Sentinel P3I program.
 - 325 Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Continue characterization and assessment of advanced focal plane array missile seekers and develop ECM to defeat them through simulation, modeling and lab testing.
 - 227 Electronic Countermeasures (ECM) Simulation - Common Set (Partner: Australia): Develop a common set of ECM simulations for investigating the EW effects on specific threat missile systems. Develop methodologies to evaluate ECM against infrared, electro-optical guided missiles to determine degradation.
 - 98 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 5888

FY 2002 Planned Program

- 4415 Conduct integrated survivability, lethality, vulnerability analyses for developmental U.S. Army air defense and missile defense systems, pre-planned product improvements of current systems, and recently fielded systems. Systems to be addressed include NMD, THAAD, Patriot and short range air defense (SHORAD). Provide interim survivability reports. Recommend survivability enhancements
 - 554 Focal Plane Array Countermeasures (FPACM) (Partner: United Kingdom): Continue characterization and assessment of advanced focal plane array missile seekers and develop ECM to defeat them through simulation, modeling and lab testing.
 - 400 Electronic Countermeasures (ECM) Simulation - Common Set (Partner: Australia): Develop a common set of ECM simulations for investigating the EW effects on specific threat missile systems. Develop methodologies to evaluate ECM against infrared, electro-optical guided missiles to determine degradation.
- Total 5369

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BUDGET ACTIVITY
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PE NUMBER AND TITLE
0605604A - Survivability/Lethality Analysis

PROJECT
672

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
672 AVIATION SYSTEMS	2528	2789	3002	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: Project investigates the Survivability/Lethality/Vulnerability (SLV) of Army aviation systems and Unmanned Aerial Vehicles (UAV) of Army Transformation to all battlefield threats. Aircraft SLV deficiencies are identified and hardening recommendations identified as appropriate. SLV analysis directly supports major decision milestone reviews, acquisition documentation, test and evaluation master plans, and cost/operational effectiveness analyses.

FY 2000 Accomplishments

- 726 Continued electronic warfare vulnerability assessment of Army aviation systems and aviation support equipment that are in development, undergoing P3I, or have been recently fielded, including RAH-66 Comanche, CH-47F Chinook and Tactical UAV. Provided electronic counter-countermeasures recommendations for Army rotorcraft and CM subsystems. Conducted E3 analysis for Suite of Infra-red counter measures (SIIRCM) system. Conducted laser jamming susceptibility analysis of SIIRCM system sensors and jam head. Initiated Information Warfare (IW) susceptibility assessment of SIIRCM and Comanche.
- 1702 Developed target descriptions and performed ballistic vulnerability analysis of four configurations of the developmental CH-47F Chinook and compared with the existing CH-47D. Continued support for CH-47F Live Fire Test and Evaluation (LFT&E) to include pre-shot predictions, test conduct on operating aircraft, damage assessments, post-shot analyses, and input to independent evaluation. Assisted in ballistic testing of Comanche prototype components and sub-systems. Initiated LFT&E survivability support for UH-60M Blackhawk modernization program.
- 100 Provided infrared and radar signature analysis data in support of Comanche MSII decision. Conducted comprehensive analysis of Comanche NBC survivability. Performed MANPRINT Solder Survivability (SSv) analyses and prepared domain reports for Comanche and Tactical UAV systems.

Total 2528

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672**FY 2001 Planned Program**

- 929 Continue electronic warfare vulnerability assessment for Comanche, CH-47F, Tactical UAV and aviation survivability equipment (SIIRCM, SIRFC) that are in development or undergoing P3I. Perform IW and communication jamming susceptibility assessment of Tactical UAV.
- 1824 Complete ballistic vulnerability analysis of four configurations of the CH-47F and compare with the CH-47D. Assist Comanche developer with ballistic vulnerability design/development support tests to guide final system design. Continue support CH-47F LFT&E (preshot predictions, conduct tests, damage assessments, post-shot analyses, and input to independent evaluation). Initiate LFT&E of UH-60M LFT&E to include selected ballistic vulnerability analysis and experiments.
- 36 Small Business Innovative Research/Small Business Technology Transfer Programs

Total 2789

FY 2002 Planned Program

- 1494 Continue electronic warfare vulnerability assessment for Comanche, CH-47F, and UH-60M aircraft
- 1508 Continue UH-60M LFT&E support (pre-shot predictions, test conduct, damage assessments, post-shot analyses, and input to independent evaluation)

Total 3002

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PE NUMBER AND TITLE
0605604A - Survivability/Lethality Analysis

PROJECT
675

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
675 ARMY SURVIVABILITY ANALYSIS & EVALUATION SUPPORT	14331	12240	4553	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: Supports survivability analysis, information warfare, and information operations of Army communications, electronic equipment and Digitized Force against friendly and enemy threats. Provides field threat environment support for Electronic Warfare Vulnerability Analysis (EWVA). Analyzes vulnerabilities of foreign threat weapons and command, control, communications, computers and intelligence (C4I) and Intelligence Electronic Warfare (IEW) systems to U.S. Army EW systems. Provides threat weapon electronic design data to countermeasure developers and technical capability information to the intelligence community. Supports Army initiatives in vulnerability reduction of C4I/IEW systems against battlefield threats, including information warfare. Provides analysis for understanding potential vulnerabilities of digitized Force XXI developmental systems. Supports Army Warfighting Experiments and associated Information Operations Vulnerability Assessments for Force XXI Architecture. Supports vulnerability analysis of situational awareness data of the Transformation Force. The reduced ballistic protection in systems of the Interim and Objective Forces compared to older heavily armored systems will increase the reliance on situational awareness for platform survivability.

FY 2000 Accomplishments

- 2515 Conducted integrated electronic and NBC effects survivability analysis on select U.S. Army command and control systems. Conducted information operations vulnerability analysis. These efforts supported the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, All Source Analysis System, Combat Service Support Control System, and Battle Command, Brigade and Below(FBCB2) (Applique).
- 1871 Conducted integrated electronic and information operations vulnerability analysis for U.S. Army communications systems on Mobile Subscriber Equipment, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, the Near Term Digital Radio, ARC-220, and Single Channel Ground/ Airborne Radio System (SINCGARS) Advanced Improvement Program (ASIP), Enhanced Position Location Reporting System - Very High Speed Integrated Circuit (EPLR-VHSIC), Spitfire, Global Broadcast System (GBS), and Integrated System Control (ISYSCON).
- 1945 Conducted integrated electronic and ballistic effects survivability analysis for U.S. Army IEW systems - Battlefield Combat Identification System (BCIS), Combat ID Dismounted Soldier (CIDDS), enhanced Firefinder radar, and Prophet.

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PROJECT

675

FY 2000 Accomplishments (Continued)

- 5000 Expanded the current information warfare vulnerability assessment program to determine exploitable weakness in the First Digitized Division (FDD) and other digitized forces and recommended mitigating solutions. Focused on components of the FDD and determined limitations of system performance in information warfare (IW) threat environment. Created partial simulation of FDD decision processes, updated information warfare vulnerability database, and conducted vulnerability analyses of Tactical Internet components to radio frequency directed energy weapons (RFDEW).
- 3000 Conducted integrated chemical/biological/nuclear/atmospheric effects survivability analysis for FBCB2, Standard Integrated Command Post Shelter (SICPS), All Source Analysis System (ASAS), ISYSCON, Common Hardware/ Software-2 (CHS-2), Single Channel Anti- Jam Manportable (SCAMP) Block II, SHF Tri-band Advanced Range Extension Terminal - Universal Modem System (STAR-T/UMS), Common Ground Surveillance System (CGS) [Joint Surveillance Target Attack Radar System (JSTARS)], and Firefinder (TPQ 47).

Total 14331

FY 2001 Planned Program

- 1153 Conduct integrated electronic and information operations effects survivability analysis for U.S. Army command and control systems. Conduct information operations vulnerability analysis. This effort supports the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, All Source Analysis System, Combat Service Support Control System, FBCB2 (Applique), and Advanced Missile Defense Warning System.
- 1487 Conduct integrated electronic and information operations survivability analysis for U.S. Army communications systems such as Warfighter Integrated Network- Terrestrial, Single Channel Anti-jam Man Portable radio, Secure Mobile Anti-jam Reliable Tactical Terminal, the Near Term Digital Radio, Joint Tactical Radio System, and SINCGARS ASIP, EPLR-VHSIC, SPITFIRE, GBS, and ISYSCON.
- 750 Expand the current information warfare vulnerability assessment program to determine exploitable weakness in the Defense Information Infrastructure Common Operating Environment
- 650 Conduct integrated electronic and NBC effects survivability analysis for U.S. Army IEW systems such as the Enhanced Firefinder radar, Navigational Warfare Ground Positioning System (NAVWAR), Defense Advanced GPS Receivers (DAGR) and Prophet. Conduct information operations vulnerability analysis for these systems.
- 2500 Expand IOVSA system assessments beyond electronic warfare, malicious codes and hackers to include survivability of the First Digitized Corp (FDC), Brigade Combat Team, and other Army systems to directed energy and unintentional radiation/emissions deterrence.

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PROJECT
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FY 2001 Planned Program (Continued)

- 5414 Establish a new set of IOVSA analytical tools, techniques and methodologies to address the shortfall of current tools that focus only on the functionality of a system. Improved tools and techniques will provide a rigorous approach to consider the impact of the threat not only on the physical system but also on decisions being made with the information that the system is providing. New tools will incorporate advances in combinatorics and logic to provide the most effective holistic vulnerability analysis.
 - 286 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 12240

FY 2002 Planned Program

- 1564 Conduct limited integrated electronic and information operations effects survivability analysis for U.S. Army command and control systems. Conduct information operations vulnerability analysis. This effort supports the Advanced Field Artillery Tactical Data System, Common Hardware and Software, Maneuver Control System, FAAD-C2I, All Source Analysis System, Combat Service Support Control System, and Advanced Missile Defense Warning System.
 - 1898 Conduct integrated electronic and information operations survivability analysis for U.S. Army communications systems such as Warfighter Integrated Network- Terrestrial, Single Channel Anti-jam Man Portable radio, the Near Term Digital Radio, Joint Tactical Radio System, and SINCGARS ASIP, EPLR-VHSIC, GBS, and ISYSCON.
 - 545 Conduct integrated electronic and ballistic effects survivability analysis for U.S. Army IEW systems such as the BCIS, CIDDS, enhanced Firefinder radar, and Prophet. Conduct information operations vulnerability analysis for these systems.
 - 546 Continue information warfare vulnerability assessment program to further determine exploitable weakness in the Digitized Forces (FDC) and to recommend mitigating solutions. Focus on components of the FDD/FDC and determines the limitations of system performance in information warfare (IW) threat environment. Update of information warfare vulnerability database, and perform vulnerability analyses of selected Tactical Internet components to radio frequency directed energy weapons (RFDEW).
- Total 4553

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COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
677 GROUND COMBAT SYSTEMS	5154	4449	4737	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: Project investigates the survivability and vulnerability of ground systems of the Interim and Objective Force for Army Transformation and other Army ground combat systems to battlefield threats. Analysis will support Army Transformation requirements, test and evaluation master plans, cost/operational effectiveness analysis, and major milestone decisions.

FY 2000 Accomplishments

- 1224 Continued analytical support for the restructured Crusader design, development and fabrication program.
- 1570 Supported the Future Combat Systems (FCS) Technical-IPT through attendance at government and contractor meetings, reviewed and provided feedback on government planning documents and contractor concepts from a survivability perspective. Developed approach to supporting survivability evaluation of FCS. Briefed FCS IPTs, PM and contractor teams on ARL/SLAD capabilities, lessons learned and approach to technical assessment of survivability concepts.
- 603 Completed Bradley A3 LFTE damage assessment, laser susceptibility assessment, NBC Contamination Survivability assessment, and initial phase of Information Operations vulnerability assessment
- 290 Supported Abrams SEP Configuration Live Fire Test and Evaluation (LFTE) by providing pre-shot predictions.
- 100 Completed Grizzly program termination activities.
- 100 Supported Future Scout and Cavalry System (FSCS) ballistic survivability TRADOC modeling effort. Supported FSCS Ballistic survivability AMSAA Item Level Performance Analysis.
- 57 Conducted Command and Control Vehicle (C2V) program termination activities.
- 1100 Provided support to the Initial Combat Brigade Team (IBCT) Platform Performance Demonstration. Conducted ballistic survivability analyses in support of the IBCT. Supported the Bid Sample Event and Source Selection of the Interim Armored Vehicle (IAV) for the IBCT. Provided ballistic and non-ballistic input to Independent Evaluation in support of IAV Milestone II.
- 110 Conducted NBC Contamination Survivability analysis on the Bradley Fire Support Team (BFIST) Vehicle/Striker.

Total 5154

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677**FY 2001 Planned Program**

- 827 Continue analytical support for the restructured Crusader design, development and fabrication program. Continue the electronic warfare vulnerability and information operations assessment for Crusader.
- 1000 Initiate Interim Armored Vehicle (IAV) LFT&E support for the first group of IAV variants/configurations (shot predictions, damage assessments, and post-shot analyses). Initiate non-ballistic survivability/lethality analysis for the first group of IAV variants/configurations.
- 1020 Support Abrams SEP Configuration LFT&E (damage assessments, post-shot analyses and input to Independent Evaluation).
- 989 Conduct initial High Mobility Rocket System (HIMARS) vulnerability assessments.
- 545 Conduct Bradley A3 SSv and provide inputs for System Evaluation Report. Continue the electronic warfare vulnerability and information operations assessment for Bradley A3.
- 68 Small Business Innovative Research/Small Business Technology Transfer Programs

Total 4449

FY 2002 Planned Program

- 1368 Support FCS program decision in May 2002 through meeting attendance and documentation and briefings of survivability evaluation results and recommendations. Support FCS program through SSEB process for second phase of program.
- 1021 Continue Abrams SEP Configuration Assessments in the areas of laser susceptibility and information assurance.
- 2348 Continue to support IAV LFT&E for the first set of variants/configurations (damage assessments, post-shot analyses and input to Independent Evaluation). Initiate LFTE support for the second group of IAV variants/configurations (shot predictions, damage assessments, post-shot analyses and input to Independent Evaluation). Complete non-ballistic survivability/lethality analysis for the first group of IAV variants/configurations. Initiate analyses for the second group of IAV variants/configurations. Provide input to Independent Evaluation for the initial IAV Milestone III decision.

Total 4737

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COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
678 MUNITIONS SYSTEMS	4208	4810	5107	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This project funds the investigation of the lethality/vulnerability of Army fire support weapons (smart and conventional) to battlefield threats. Support Army Transformation to a highly effective mobile force depending on symmetry between Survivability, Lethality, Mobility, MANPRINT, Deployability, and Sustainability. The challenge of the Army Transformation is to examine holistically the contribution of platforms to force effectiveness. This project provides lethality data of potential systems in the Interim and Objective Forces to achieve symmetric mix of force effectiveness. The analysis is integrated across all battlefield threats (i.e., conventional ballistic, electronic warfare, and directed energy). This work is accomplished through theoretical and engineering analyses, signature measurements, modeling, simulations, laboratory experiments, and field investigations.

FY 2000 Accomplishments

- 2103 Conducted electronic warfare vulnerability assessments for advanced developmental U.S. Army conventional and smart munition systems and associated pre-planned product improvement programs. Conducted electronic warfare vulnerability analysis/support for U.S. Army munition systems - Army Tactical Missile System (ATACMS) with smart payloads such as BAT/BAT P3I, TOW Fire and Forget, SADARM, and Tank Extended Range Munition (TERM).
 - 1610 Conducted ballistic survivability/lethality analysis for U.S. Army munition systems to include BAT/BAT P3I, Guided MLRS and M829 and associated pre-planned product improvement programs.
 - 495 Provided integrated survivability/lethality analyses to support munition systems program decision milestones during FY 2000.
- Total 4208

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)**June 2001**

BUDGET ACTIVITY

6 - MANAGEMENT SUPPORT

PE NUMBER AND TITLE

0605604A - Survivability/Lethality Analysis

PROJECT

678**FY 2001 Planned Program**

- 3022 Conduct electronic warfare vulnerability assessments for developmental U.S. Army munition systems such as ATACMS with smart payloads such as: BAT P3I, TOW Fire and Forget, Wide Area Munition (WAM) product improvement program (PIP) and TERM. Conduct obscurant and atmospheric effects survivability analysis for U.S. Army munition systems.
 - 1215 Conduct ballistic survivability/lethality analysis for U.S. Army munition systems to include BAT P3I, TERM, LOSAT, Guided MLRS and M829.
 - 507 Provide integrated survivability/lethality analyses to support scheduled munition systems program decision milestones during FY 2001.
 - 66 Small Business Innovative Research/Small Business Technology Transfer Programs
- Total 4810

FY 2002 Planned Program

- 3022 Conduct electronic warfare vulnerability assessments for developmental U.S. Army munition systems such as ATACMS with smart payloads such as: BAT P3I, TOW Fire and Forget, Modernized HELLFIRE/Common Missile, WAM PIP and TERM. Conduct obscurant and atmospheric effects survivability analysis for U.S. Army munition systems.
 - 1513 Conduct ballistic survivability/lethality analysis for U.S. Army munition systems to include BAT P3I, TOW Fire and Forget, TERM, LOSAT, Guided MLRS, Modernized HELLFIRE/Common Missile, WAM PIP and M829.
 - 572 Provide integrated survivability/lethality analyses to support scheduled munition systems program decision milestones during FY 2002.
- Total 5107